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have made, however, all three of the above determinations: namely, moisture, oleo-resin (evaporated ethereal extract), and ash. In some cases these three data, taken together, are necessary in determining values.

According to Mr. Bell, *American Journal of Pharmacy*, Oct. 1888, the appearance of the evaporated ethereal extract must be carefully noted, as it affords an excellent clue to possible adulteration. It should be dry, somewhat scaly, and the resin should show numerous projecting crystals of piperine. If it has a dark, oily appearance and is mostly amorphous, adulteration is indicated.

I may add that it is not only a *dark* coloration of the residue that indicates adulteration, but if the color is of a very *reddish* hue in thin layers, the indication is, presence of capsicum, (added, doubtless, to give pungency to the inert adulterant.)

The result of the examination is as follows:

	Moisture.	*Resin and piperine.*	*Ash.*
No. 1	10.43	4.6	5.5
No. 2	10.34	10.3	2.5
No. 3	14.25	7.3	2.
No. 4	9.75	7.9	5.
No. 5	Lost.	5.1	1.5
No. 6	11.20	7.8	7.
No. 7	7.10	7.2	2.5
No. 8	11.25	4.9	2.5
No. 9	10.78	6.6	3.
No. 10	9.80	5.9	3.

In conclusion, I would say that a physical examination is quite essential to a satisfactory analysis of pepper. This I have not as yet made, because I have yet to select the adulterated specimens of other samples, and then, by microscopic examination, determine the kind of adulterants used. This can be done very largely by physical examination.

ANIMAL ETHICS.

BY A. H. THOMPSON, TOPEKA, KANSAS.

The following brief contribution to the study of animal ethics, comparative ethics, or morals among animals, is submitted without comment upon the more elaborate studies of the subject that may have been made by the masters in natural science, but is presented merely as amateur browsings in a very interesting field of psychological research.

At the outset we are met by the query: Do animals possess a morality at all? Do they ever distinguish between right and wrong, between justice and injustice, kindness and cruelty, honesty and dishonesty, vice and virtue, and other moral attributes, among and between themselves? Do they have any respect for the rights of others? Do they ever attempt to control their own selfish impulses for the good of others, or for the good of an animal community? Let us make a study of their moral manifestations, and endeavor to obtain an answer to these queries.

A great difficulty confronts us at the beginning of our investigations by the apparently complete absence of similarity or sympathy between the mental processes and reasoning actions of the lower animals and of man. Not only is the nervous organization of man of a much higher grade, and his mental powers consequently much superior, but the methods of his mind are of a very different order. Both in quantity and quality of psychic processes he varies infinitely from the other animals around him, so that he has little in common with them. But yet his mind, with his nervous organization and his physical body, must have ascended through ages of animal ancestry to its present supreme position. The process of evolution has produced a being totally different from, and vastly superior to, all the forms through which he has passed in development. While retaining much that betokens the animal in mental constitution, and as regards mere nervous actions, yet the superimposed qualities — the soul if you please — mark him, and set him apart as a distinct being — an animal with the touch of divinity.

But yet in the earliest history of his species his mental powers and emotions were but little different, either in quantity or quality, from the other animals around him, and he waged a warfare for mere existence on the same level with them. But from this he passed on to a higher plane, and became a different order of being. It is not possible for us to carry ourselves back in imagination over the path of our wonderful mental development to the time in the infancy of our species when the mind of man was wholly undifferentiated from that of other mammals. Yet that would be necessary to place ourselves *en rapport* with the animal mind, for at that stage man thought and acted like the animal that he was. We are, therefore, forced to make our study *objective*, rather than *subjective*, and to investigate the animal mind through its phenomena. This places us at a disadvantage at once. But not so much as would appear at first thought, when we consider that science is but the study of phenomena and their classification; and from the constancy of phenomena, theories, principles and laws are elaborated. From this, the scientific standpoint, we will endeavor to make a brief study of animal ethics, which will be suggestive rather than exhaustive.

In the first place we notice that the animal mind, and through the mind, the emotions and impulses, is controlled and moulded by two great dominating instincts: the first is the instinct of self-preservation; the second is that of the propagation of the species. Around these absolute and all-powerful faculties cluster all the minor mental and emotional actions and manifestations that we are pleased to call the indications of reason or affection.

The first, the instinct of self-preservation, is essentially and purely selfish. It is prompted by the instinctive and perhaps somewhat reasoned desire to live and avoid suffering, and escape death. The desire for life is inherited and unconscious. The fear of pain is instinctive; but, in addition, as the animal lives, this is accelerated by experience and observation. The fear of death — the understanding of death, as observed in other animals dying or dead, must be an inherited instinct, mounting to the plane of conscious reasoning, for an object in fighting is to produce death, which, they must reason, renders an adversary harmless, or an edible animal fit for food. So, too, it must become, in their minds, a condition which they fear and dread, much, indeed, as man does, and with much the same indefinite understanding of it. If they could grasp the idea of immortality, self-preservation would prompt them to yearn for such a condition also, as man does.

One of the worst features of this strong instinct is, that in the procuring of food, in warfare, defensive and offensive, etc., it is the cause of much destruction of life, and too often develops into wantonness, merely for the love of killing. Unavoidable cruelty is bad enough, from our moral standpoint — barely allowable, in fact, seeing that we practice it. But there is a difference in the fact that we do, or should, regret the necessity of destroying life that we may live; but animals do not seem to possess any such feeling; on the contrary, throughout the whole carnivorous kingdom, at least, the great prey upon the less, the strong upon the weak, the weak upon the still weaker, and so on down to microscopical infinity. Nature is one vast slaughter-house — cruelty, death, destruction are everywhere. This destruction is often causeless, and is always selfish and heartless. It is devoid even of the chivalrous element of combat, of challenge, and equal chance, for it is usually a cowardly assault of the strong upon the weak. However, man can claim little moral superiority in that respect, for in the commercial world the strong continually prey upon the weak, and often without the excuse of the necessity for self-preservation, but merely for the greed of gain. There is no excuse for it in either case, except the cruel and heartless law that might makes right.

But for the practice of the cruelty prompted by the instinct of self-preservation, there is an amount of reasoning power exhibited by animals by the expedients employed in emergencies, that we cannot but admire while we deplore the motive. This is strikingly illustrated by those incidents so familiar to all students of natural history, wherein a considerable amount of reasoning is employed, of judging from cause to effect, of complicated strategy, etc., for the purpose of obtaining food, either by deceiving and entrapping other animals, or to secure inaccessible vegetable food. Such incidents display a knowledge of the habits of other animals, or of the qualities of natural products, which could come only from intelligent observation — the same methods of reasoning, perhaps, that are employed by man in attaining the same knowledge. These powers are employed also, of course, in self-protection, and in attempts to escape from pursuit, and often with the greatest success.

But here we are glad to record that this intelligence is not always exercised for self alone, but often in an unselfish way for the benefit of other individuals. Strong animals thus often assist the weaker ones; those which appeal to heart-like sympathy by their helplessness, either through sickness or injury. They will protect such unfortunates from the attacks of others, take them to shelter, carry them food if unable to be led to it, and perform other unselfish acts, which are prompted purely by love and friendship. Not only is this of common occurrence with dogs and other animals of higher intelligence, but of many lower vertebrates, and even of the invertebrates. Snails have been known to display this affection and care of the stronger for the weaker. Indeed, the strong often suffer by the willing sacrifice of food to the weak, and go hungry. And beyond that they will sometimes give their lives for that of a companion, or for man. Surely human devotion and love can go no further than that. Such manifestations of affection and friendship are pleasant to record, as they stand out in such vivid contrast against the background of universal animal cruelty. In this connection we also note the expressed sympathy and affection displayed for companions in suffering and distress. Ants have been observed to exhibit this feeling; and it is common among the higher vertebrates.

Then, again, we must note with pain too frequent inexplicable cruelty exhibited by the ruthless destruction of wounded or disabled companions. Even the domestic animals sometimes practice this. We cannot understand if this is because they wish to put the sufferer out of misery, or the fear that the cries or blood may attract fierce carnivora; but it must be an inherited impulse.

A marked instance of ethical feeling, of regard for the rights of others, is exhibited in animals which associate in numbers for mutual advantage to capture prey and then mutually grant a division of the food so obtained. This displays thoughtfulness for each other, and honesty as regards partnerships. It also indicates some intelligence in appreciating the value of association and coöperation, and is one of the many instances which necessitates some mode of communication by which there is mutual understanding. There is a sense of duty and of obligation which compels a fair division and recognizes equal rights. We must give such animals credit for not indulging in cannibalism, even when excessively hungry, although they do commit a cruel crime in destroying wounded companions. In this association we must give them credit for mutual confidence and fidelity, and perhaps of affection — for who can tell what friendships may exist even among the most savage animals? Then bees and ants rise to higher level in their complicated communities, in which there is such a division of labor and mutual understanding as to closely resemble human community life.

In this connection, we may note one of the most remarkable results of the workings of self-preservation — the slavery of other animals. The most remarkable instance of this, of course, is the slavery among ants. But with them the servitude is compensated for by the protection afforded, and the plentiful food supplied to the slaves, and is therefore not all unkindness. Some warlike species cannot live at all without their attendant slaves to wait upon and feed them. It is to be questioned if the enslaved are worse off than when in freedom, for the consideration of sentiment does not reach them at all. Ants also enslave the aphides for the sweet secretion, the milk, which they yield. This, however, is akin to domestication, and is comparable to our domestication of other animals. Compulsory servitude is slavery when applied to our species — domestication when applied to other species of animals. But the masters make a complete return for services rendered, in supplying all the wants of the enslaved species.

But again, there is a kind of servitude that is without any redeeming merits whatever, and is indeed cruel and heartless. This is illustrated by certain birds, as the frigate bird, which obliges the fish hawk to fish for him, and the sea gull, which exacts such service from the cormorant. Not only do they rob the unfortunates of the fruits of their industry, but purposely compel them to catch more for their tormentors. This is a compulsory servitude, a rank robbery of work, without the return of food, or protection, or any other compensation. This slavery has now gone on so long that the dominant species cannot live without it, and in the case of the frigate bird the feet and claws are now so reduced by disuse that it cannot catch its own fish if it desired to do so. Some species of fish hawks, during generations of this slavery and subjugation, have become hereditarily accustomed to it, and obey the tyrants of the air without much objection. Other species, not so well accustomed to it, are often driven to the death by these cruel despots, through misunderstanding of what is wanted of them. Instances of unrequited service are found in other species of animals, as well as in man.

The affectionate personal attachment that animals often manifest for each other, or between members of different species, as a dog and horse, cat and horse, dog and elephant, etc., is proof of their possession of the higher feelings and emotions. The fidelity of the dog is so pure and unselfish as to put to shame our own species, with all our boasted moral exaltation, and needs only to be mentioned in this connection. There are many curious friendships throughout the animal world, such as the plover and the crocodile, the rhinoceros-bird and his host, and similar attachments. Birds seem to possess the most love and friendship, and their fidelity and love for each other are proverbial. Snails have also been known to display an affection for a particular person. But this feeling is manifested in all species, and especially in the higher mammals, whose attachments for each other or for man are so well known, and which sinks all selfishness in its regard for others.

The sexual and parental instinct is the second greatest animal impulse, on which depends the perpetuation of the species, and is the center of a variety of emotions and mental actions. The instinct of self-preservation often disappears before the assertion of the instinct of perpetuation of the species. Many a battle-scarred old male bears testimony to the devotion and self-sacrifice of his sex in the cause of gallantry toward the gentler sex. Much cruelty is consequent upon the conflict of males for supremacy in the favor of the females, and they willingly endure much pain and suffering. Of course, the sexual passion is the inspiring force, but this is sometimes elevated by a strong personal attachment and true friendship, which often lead to life-long companionship. With the females, of course, the maternal instinct is the all-powerful controlling power, and develops a beautiful, self-sacrificing devotion to offspring in almost all species. This feeling is a pure love, as devoted and self-forgetful as in the human species. The mothers, in almost all animals, especially mammals and birds, willingly, and often needlessly, run risks, and sacrifice their lives to save offspring from real or fancied danger. With insects, there is little of this feeling, for the mother perishes with the laying of the eggs as a rule, although great care and affection are bestowed upon the preparation of the nest, and depositing the eggs. It is the one object and passion of their lives. Fish often exhibit a strong feeling for the eggs as the young; but reptiles do not give much attention to the young, and rarely display any affection for them. But the idea of duty, in caring for the young, is probably never conceived by animals, and instinct takes its place to insure perpetuation of species.

The idea of property rights is often exhibited by animals, especially in the protective instinct of the dog. It must be manifested to some extent in wild animals in regard to the ownership of game or food, as in respecting the rights of domicile; but of this we have no direct proof. There are examples, however, of the rights of parents in their offspring being regarded by stronger animals.

But we must close our study of the subject for the present, with the hope of contributing other suggestions in the future, and especially with the wish that these random thoughts may provoke observation and discussion in others.

MAMMALS OF WESTERN KANSAS.

BY A. B. BAKER, OF WAKEENEY, KANSAS.

The following is a list, accompanied by a few brief notes, of mammals found along the hundredth meridian between N. latitude 38.30 and 39.30.

This list, having been prepared without access to authorities, will unavoidably contain inaccuracies in nomenclature and otherwise.

Only such species are included as have been taken by the writer within the past five years.

FELIDÆ.

Lynx rufus, Raf., (Wild Cat): Common along wooded streams, and among the chalk bluffs; preys but little upon sheep or poultry. Two females taken in May; contained two young each.

MUSTELIDÆ.

Putorius longicauda, Rich., (Long-tailed Weasel): Not common; inhabits prairie dogs' burrows and holes among rocks; not seen here till the present year.

Putorius nigripes, Aud. & Bach., (Black-footed Ferret): Lives in prairie dogs' burrows, and preys upon these rodents; makes occasional inroads also upon poultry. It is generally to be found in the larger prairie-dog "towns," but is nowhere numerous.

Lutra canadensis, Sab., (Otter): Occasional along streams.

MELINIDÆ.

Taxidea americana, Waterh., (Badger): Common; lives in burrows on the open prairie.

Mephitis mephitica, Shaw, (Common Skunk): Very numerous and destructive to poultry.

Spilogale interrupta, (Little Striped Skunk): Not seen here till the autumn of 1887. Of twenty skunks taken since that time, one-third were of this species.

CANIDÆ.

Canis occidentalis, (Gray Wolf): Formerly quite numerous; now uncommon, and found only in rough country along streams.